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Alzheimer’s Disease Research Outline/Work Cited

April 15, 2014

Alzheimer’s Disease Research Outline

1. What is Dementia?
   1. Decline in mental ability interfering with everyday tasks 1  
      i). Brain cells in distinct regions cannot carry out functions with ease  
      ii). Cell damage in particular regions is associated with different types of dementia   
      iii). High levels of particular proteins within and outside the brain cells result in difficulty   
       communicating and Alzheimer’s disease, for example 1
   2. Symptoms such as communication, reasoning and judgment worsen with time  1
2. What is Alzheimer’s disease?  
   a) Most common form of dementia 1  
   b) Course is not the same for everyone, however, symptoms seem to develop over same   
    general stages.
3. Stages and Symptoms of Alzheimer’s   
   a) Mild Alzheimer’s disease   
    i) as number of plaques and tangles grows, shrinkage progresses and more of the cerebral   
    cortex is affected 1  
    1. Plaques are deposits of a protein fragment called beta-amyloid and build up in spaces between nerve cells. 1  
     
    2. Tangles are twisted fibers of another protein called tau (rhymes with wow) that builds up inside cells 1  
    3. Those with Alzheimer’s develop more plaques and tangles with aging. Experts believe plaques and tangles block communication among nerve cells and disrupt processes cells need in order to survive, like memory, for example. 1  
    ii) Individual may feel he or she is having memory lapses, but takes awhile for symptoms of dementia to be detected. 1  
      
   b) Moderate Alzheimer’s Disease   
    i) Affected regions continue to shrink, ventricles enlarge, and signs and symptoms become more evident  
    1. Behavioral symptoms, such as wandering and agitation can occur.  
    2. Inability to learn new concepts or cope with new situations  
    3. Repetitive statements, inappropriate outbursts of anger, shortened attention span   
   c) Severe Alzheimer’s disease   
    i) Most areas of the brain have shrunk further, and ventricles have enlarged even more.  
    1. Cannot recognize family or loved ones or converse in any way  
    2. Fully dependent on others for care  
    2. Most frequent cause of death is aspiration pneumonia   
    (unable to swallow and takes food or liquids into lungs instead of air)
4. Genetics & Alzheimer’s disease  
    a) Two forms with diverse patterns of genetic inheritance: Early Onset, Late Onset 6  
    b) Early Onset  
    i) Rare, accounts for one in 1,000 cases of Alzheimer’s disease. Symptoms appear   
    before age of 65  6  
    ii) Often referred to as a familial disease, as several generations can be affected  6  
    iii) Caused by mutations in one of three genes: APP and two presenlin genes  6  
    1. Amyloid Precursor Protein (APP) gene on chromosome 21, affects making the   
    protein amyloid  6 2. PSEN-1 gene on chromosome 14 causing symptoms to begin as early as 30   
    years of age 6

c) Late Onset

* + 1. More common; A relative with this increases chances of developing   
       (inheritance follows complex pattern) 6
    2. All individuals have two copies of the APOE gene, whether the same or different from one another. Six possible combinations: ε2/ε2, ε2/ε3, ε3/ε3, ε2/ε4, ε3/ε4 or ε4/ε4 6
    3. As of 2009, greatest (and only) known impact on developing late onset was Apolipoprotein E (APOE) on chromosome 19 in its three forms: APOE ε2, APOE ε3, APOE ε4 6
       1. APOE ε2, mildly protective, less likely to develop Alzheimer’s 6
       2. APOE ε3, most common, neural role (neither decreasing nor increasing) 2
       3. APOE ε4 increases lifetime risk of developing Alzheimer’s by up to four times 6
    4. International Genomics of Alzheimer’s Project  
       1. Europe and the USA have joined forces with hope to have largest and most   
        beneficial genetic study of Alzheimer’s disease 3  
       2. October 27, 2013, the group found 11 new genes providing insight: APOE,   
        PICALM, CLU, CR1, BIN1, MS4A, CD2AP, EPHA1, ABCA7, SORL1 and   
        TREM2 13  
       3. Group had largest genetic analysis conducted in Alzheimer’s Research with 74,000   
        volunteers having DNA scanned 13

1. Diagnosis
   1. Biomarkers
      1. Indicators of changes in sensory abilities, or substances that appear in body fluids, such as blood, cerebrospinal fluid, or urine.
      2. Indicate exposure to a substance, the presence of a disease, or the development over time.  
         (example: high blood cholesterol is a biomarker for risk of heart disease)
      3. Helps detect early signs and symptoms of Alzheimer’s
      4. Protein markers help with analyzing various genetic factors allowing redefining Alzheimer’s disease in terms of molecular pathways 12
   2. History of concussion have more buildup of Alzheimer’s disease-associated plaques in the brain than those who had concussions but do not have memory problems.
   3. Doctors conduct tests of memory, problem solving, and language   
       i) A second opinion is imperative as signs and symptoms may be overlooked or   
       unclear  
       ii). Helps confirm the diagnosis
   4. Brain Scans, ex. CT or MRI   
       i). Helps distinguish Alzheimer’s from other possible causes for symptoms
   5. Tests repeated over time 7  
       i) Gives Doctors information regarding health and memory changes 7  
       ii) Diagnoses other causes of memory problems 7
   6. Genetic Testing   
       i) Although a blood test can identify which APOE alleles a person has, it cannot predict   
       who will or will not develop Alzheimer’s Disease 2
2. Treatment & Management of Alzheimer’s Disease   
   a) Early and accurate diagnosis provides time for planning future   
   b. Nursing home care or wherever most comfortable   
   c. Doctors conduct tests of memory, problem solving, and language   
    i) Bilingualism can be seen as a successful brain training, contributing to cognitive   
    reserve 11  
    1. Cognitive reserve is the ability of the brain to keep functioning normally despite   
    significant disease or injury 11  
    2. Those with a greater cognitive reserve experience the onset of dementia later in life   
    than those with less reserve 11   
    d. Limited research suggests that long-term use of healthy amounts of coffee and caffeine   
    may protect against cognitive decline or dementia 4  e. Induction of the repressor element 1-silencing transcription factor (REST) 8   
    i). REST, universal feature of normal ageing in human cortical and hippocampal neurons 8   
    ii) Represses genes that promote cell death and Alzheimer’s disease pathology and   
    induces the expression of stress response genes 8   
    iii) REST potently protects neurons from oxidative stress and amyloid beta- protein   
    toxicity and conditional deletion of REST in the mouse brain leads to age-related,   
    neurodegeneration 8   
     
     
     
     
     
     
     
     
     
     
     
     
     
     
     
     
     
     
    Notes

1Information pertaining to the Alzheimer’s Research Project comes from Alzheimer’s Disease & Dementia Alzheimer’s Association unless otherwise noted.   
 2Information pertaining to the Alzheimer’s Research Project comes from “Alzheimer’s Disease Genetics Fact Sheet,” unless otherwise noted.   
 3Information pertaining to the Alzheimer’s Research Project comes from “Alzheimer’s disease,” unless otherwise noted.   
 4Information pertaining to the Alzheimer’s Research Project comes from “Current Evidence for Use of Coffee and Caffeine to Prevent Age-related Cognitive Decline and Alzheimer’s Disease,” unless otherwise noted.   
 5Information pertaining to the Alzheimer’s Research Project comes from “Concussions Linked to Alzheimer’s Risk in Study,” unless otherwise noted.   
 6Information pertaining to the Alzheimer’s Research Project comes from “Genetics of dementia,” unless otherwise noted.   
 7Information pertaining to the Alzheimer’s Research Project comes from “Latest Facts & Figures Report,” unless otherwise noted.   
 8Information pertaining to the Alzheimer’s Research Project comes from “REST and Stress Resistance in Aging and Alzheimer’s Disease,” unless otherwise noted.   
 9Information pertaining to the Alzheimer’s Research Project comes from “About Alzheimer’s Disease: Symptoms,” unless otherwise notes

10Information pertaining to the Alzheimer’s Research Project comes from “Alzheimer’s Disease: Unraveling the Mystery,” unless otherwise noted  
11 Information pertaining to the Alzheimer’s Research Project comes from “Speaking Two Languages May Delay Dementia Symptoms,” unless otherwise noted.   
 12Information pertaining to the Alzheimer’s Research Project comes from “Reverse Engineering of Alzheimer’s disease Based on Biomarker Pathways Analysis,” unless otherwise noted.

13Information pertaining to the Alzheimer’s Research Project comes from “NIH-supported study identifies 11 new Alzheimer’s disease risk genes,” unless otherwise noted.

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